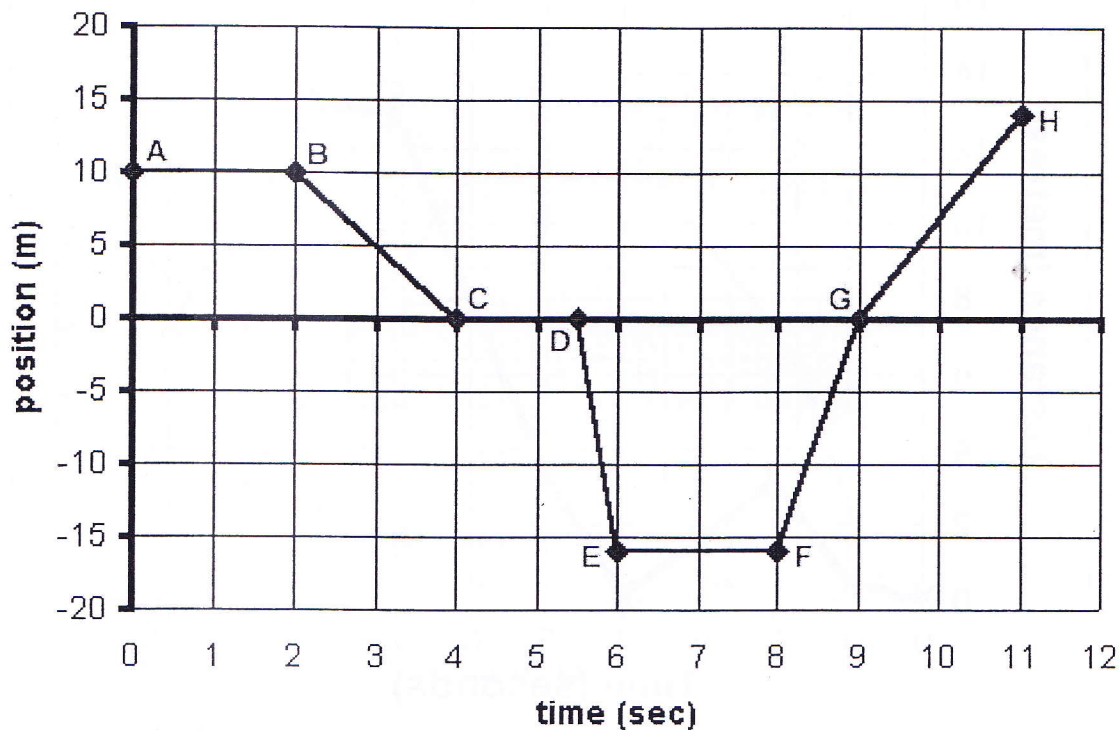


Interpreting Position-Time Graphs

A. The graph below shows the motion of a car.

1. Describe the motion of the car (qualitatively) during each segment.
2. Describe the change in position of the car during each segment.
3. Calculate the velocity of the car during each segment.
4. What is its *average speed* for the entire 12-s?
5. What is its *average velocity* for the entire 12-s?
6. What is the acceleration of the car during each segment?
7. Sketch a v-t graph that corresponds to this x-t graph.

Position vs Time

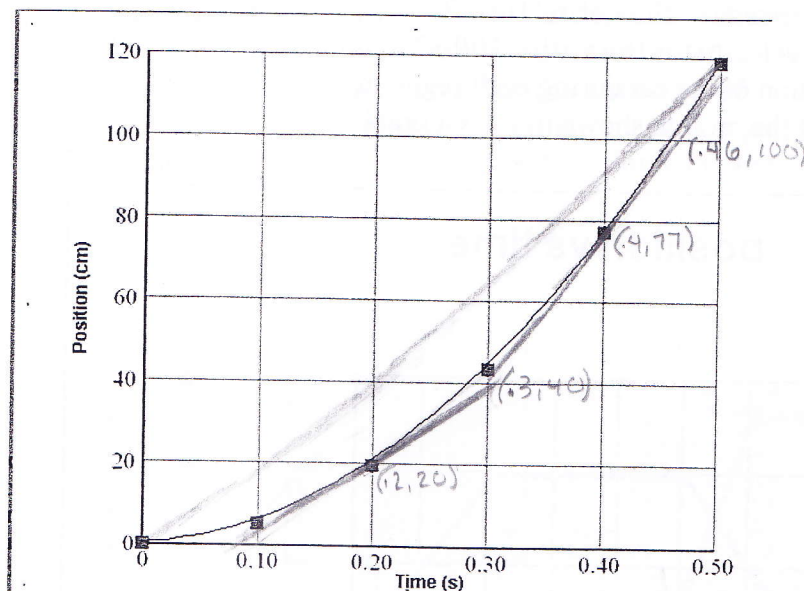


segment	describe	time (s)	initial x(m)	final x(m)
AB	rest	2	10	10
BC	constant towards	2	10	0
CD	rest	1.5	0	0
DE	constant negative	.5	0	-16
EF	rest	2	-16	-16
FG	constant positive	1	-16	0
GH	constant away	2	0	14

Interpreting Position-Time Graphs

D. The graph below shows an x-t graph.

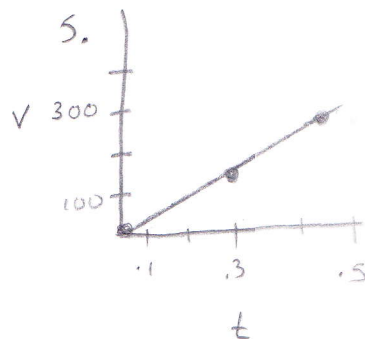
1. Describe the motion of the object (qualitatively). *increasing in speed*
2. Calculate the instantaneous velocity of the car at 0.2 seconds. *200 cm/s*
3. Calculate the instantaneous velocity of the car at 0.4 seconds. *383.3 cm/s*
4. What is its *average speed* for the entire 0.5-s? *240 cm/s*
5. Sketch a v-t graph of the motion shown in the x-t graph.



$$2. \frac{\Delta y}{\Delta x} = \frac{40 - 20}{0.3 - 0.2} = \frac{20}{0.1} = 200 \text{ cm/s}$$

$$3. \frac{100 - 77}{0.46 - 0.4} = \frac{23}{0.06} = 383.3 \text{ cm/s}$$

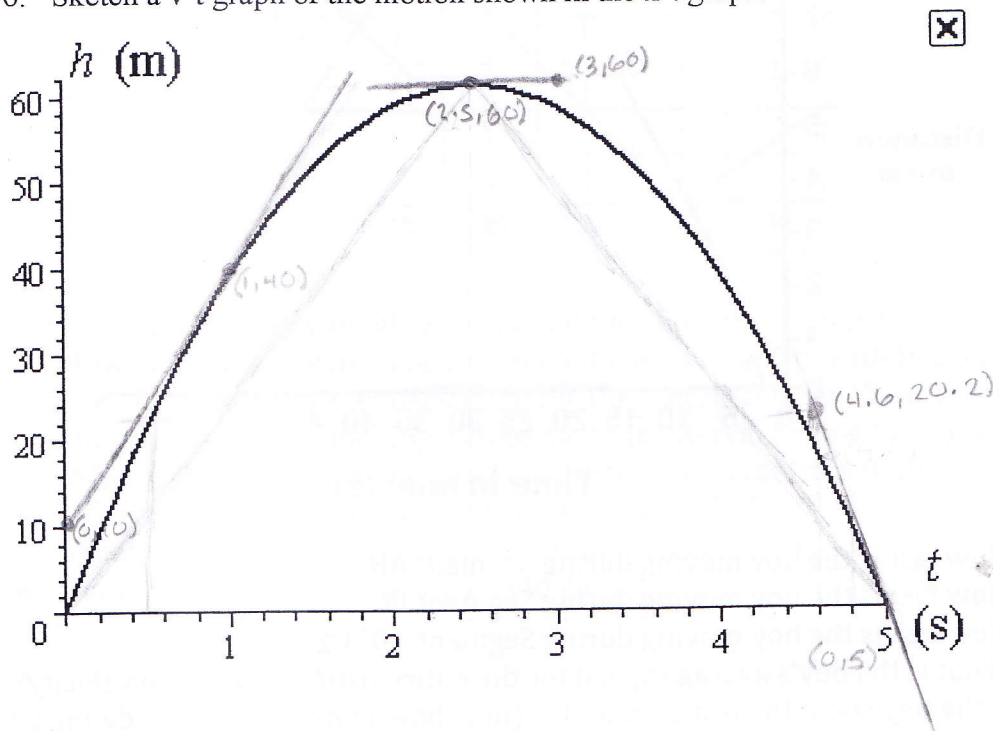
$$4. v = \frac{\Delta d}{\Delta t} = \frac{120}{0.5} = 240 \text{ cm/s}$$



Interpreting Position-Time Graphs

E. The graph below shows an x-t graph.

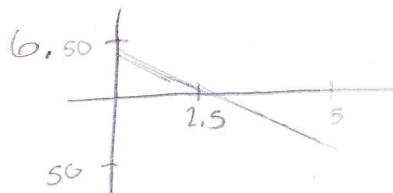
- Describe the motion of the object (qualitatively). *speeds up then stops at top, then decreases in opposite direction*
- Calculate the instantaneous velocity of the car at 1 seconds. *30 m/s*
- Calculate the instantaneous velocity of the car at 2.5 seconds. *0 m/s*
- Calculate the instantaneous velocity of the car at 5 seconds. *-50 m/s*
- What is its *average* velocity for the entire 0.5-s? *0*
- Sketch a v-t graph of the motion shown in the x-t graph.



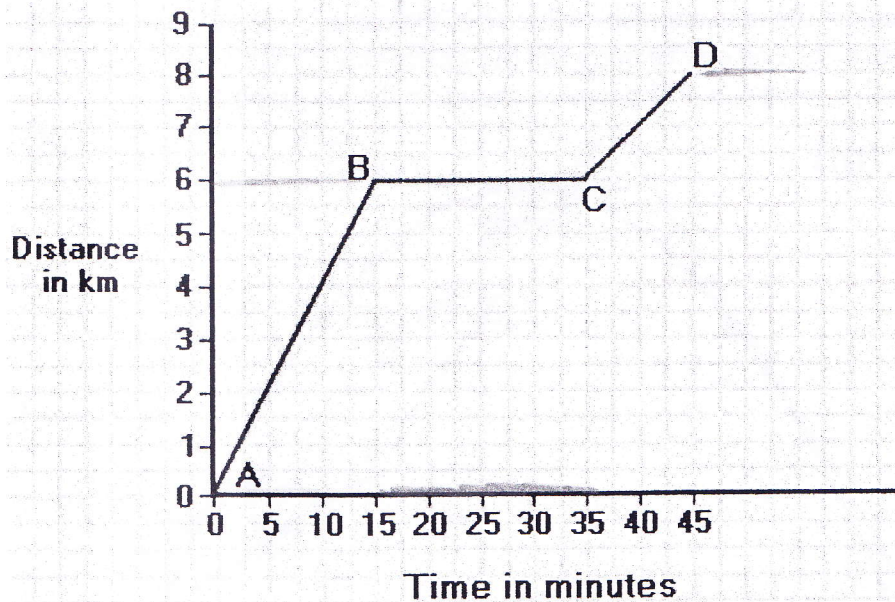
$$2. \frac{40-10}{1-0} = \frac{30}{1} = 30 \text{ m/s}$$

$$3. \frac{60-60}{3-2.5} = 0 \text{ m/s}$$

$$4. \frac{\Delta y}{\Delta x} = \frac{0-30}{5-4.4} = \frac{-30}{.6} = -50 \text{ m/s}$$



F. The graph below represents a boy riding his bicycle with his friends around town after school. Express all answers in km/hr.



- How fast is the boy moving during Segment AB? *24 km/hr*
- How fast is the boy moving during Segment BC? *at rest*
- How fast is the boy moving during Segment CD? *12 km/hr*
- What is the boy's average speed for the entire trip? His average velocity? *10.67 km/hr*
- If the boy spent the last 15 minutes (not shown on the graph) pedaling all the way back home, what is his *average velocity* for the entire hour? *0*
- Sketch a v-t graph that corresponds to this x-t graph.

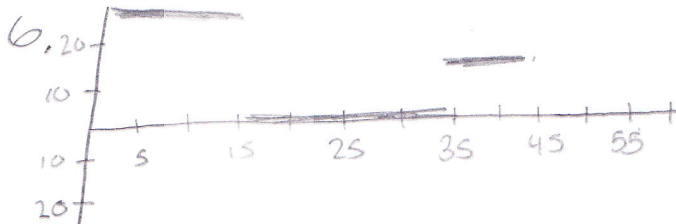
$$1. \frac{6}{15} = \frac{6}{.25} = 24 \text{ km/hr}$$

2. *at rest*

$$3. \frac{2}{.6} = 12 \text{ km/hr}$$

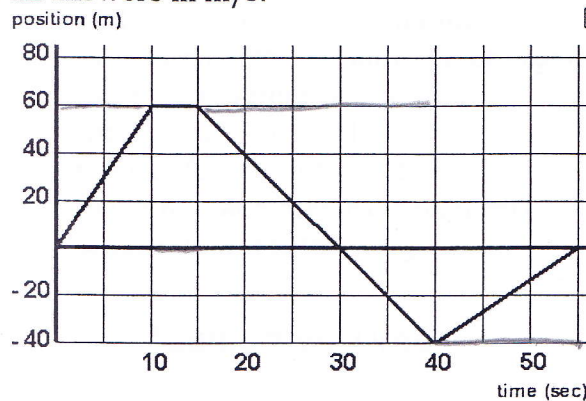
$$4. \frac{8}{.75} = 10.67 \text{ km/hr} = \frac{D}{t}$$

5. *0 cause he's going back home*



Interpreting Position-Time Graphs

G. The graph below represents a boy riding his bicycle with his friends around town after school. Express all answers in m/s.



- How fast is the boy moving during the time interval from 0-10 seconds? 6 m/s
- How fast is the boy moving during the time interval from 10-15 seconds? 0 m/s
- How fast is the boy moving during the time interval from 15-40 seconds? 1.8 m/s
- How fast is the boy moving during the time interval from 40-60 seconds? 0 m/s
- What is the boy's average speed for the time interval from 0-40 seconds? 1 m/s
- What is his *average speed* for the entire hour? 8.33 m/s
- What is his *average velocity* for the entire hour? 0 m/s
- Sketch a v-t graph that corresponds to this x-t graph.

1. $\frac{60}{10} = 6 \text{ m/s}$

2. 0 m/s

3. $\frac{20}{25} = .8 \text{ m/s}$

4. 0 m/s

5. $\frac{-40}{40} = -1 \text{ m/s}$

6. $\frac{500}{60} = 8.33 \text{ m/s}$

7. 0 m/s